

**CALL FOR FY 2007
DOD HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM
DEDICATED HPC PROJECT INVESTMENT PROPOSALS**

INTRODUCTION

General: The High Performance Computing Modernization Program (HPCMP) is soliciting Service/Agency relevant proposals to satisfy high priority requirements that cannot be met with its existing high performance computing (HPC) resources. Only proposals for HPC resources will be considered; proposals primarily for storage, visualization, or networking will not be considered. In addition, HPC project proposals whose requirements can be reasonably addressed by existing MSRC resources will not be considered.

The goals for Dedicated HPC Projects are to support projects that generally:

- (1) Require access to data or computational resources under time critical constraints that cannot reasonably be supported on a shared HPC system, or cannot tolerate network latencies.
- (2) Require extreme security, have unconventional operating conditions, or need early access to HPC technology.

Requirements Validation: Organizations submitting proposals should ensure that the project(s) to be supported in their proposals have been entered into the HPC Modernization Program (HPCMP) requirements database, and that their Service/Agency has validated the projects' requirements. The HPCMP Office (HPCMPO) point-of-contact for requirements entry and validation is Ms. Cathy McDonald, at mcdonald@hpcmo.hpc.mil or 703-812-8205. All proposed projects' HPC requirements **MUST** be entered into the database for the Dedicated HPC Project Investment proposal to be considered. The FY 2007 requirements database will be queried through 1 May 2006 to ascertain the presence of proposed projects' requirements. Submitted proposals should show no conflict in stated requirements with the requirements database.

PROPOSAL SUBMISSION

General: Proposals must be submitted through the High Performance Computing Advisory Panel (HPCAP) and are due 7 April 2006. Each HPCAP principal may establish earlier internal deadlines for submission to the Services/Agencies to meet the 7 April deadline to the HPCMPO. Please contact these points-of-contact directly for their respective internal deadline for submission:

Air Force: Dr. Leslie Perkins, Leslie.Perkins@wpafb.af.mil

Army: Mr. Harold Breaux, harold@arl.army.mil, or Mr. Robert Sheroke, rsheroke@arl.army.mil

Navy: Dr. Ronald Joslin, JoslinR@onr.navy.mil

DTRA: Ms. Jackie Bell, Jacqueline.Bell@dtra.mil

MDA: Mr. Guy Hammer, Guy.Hammer@mda.osd.mil

C3I (NIMA): HPCMPO, require@hpcmpo.hpc.mil

DARPA: Dr. Steven Walker, swalker@darpa.mil

The HPCMP requires that each proposal packet be submitted as one **unbound** color original, one **unbound** color copy, and one PC-based diskette, or CD-ROM electronic copy. The electronic files should be in Microsoft Office 95 (or later; through 2003/XP) formats. An electronic proposal copy should be in the form of one file. If there are multiple files, a "README.doc" file must be present in the electronic submission explaining the purpose of each file in producing a complete copy of the proposal.

Questions: For questions relating to the mechanics of preparing a proposal packet please contact the Dedicated HPC Projects Investment Manager, Mr. Stephen Schneller, at *schnell@hpcmo.hpc.mil* or 401-832-3820.

PROPOSAL EVALUATION

Criteria: Proposals will be judged on the following criteria:

- (1) DoD Mission Priority and Criticality
- (2) Service/Agency Mission Priority
- (3) Military Advantage Gained by Exploiting HPC
- (4) Merit of Scientific Study Including Numerical Methods
- (5) Potential for Significant Progress Gained by Exploiting HPC
- (6) Appropriateness of Hardware Solution for Meeting Requirements

A combined panel from the staff of the Deputy Undersecretary of Defense for Science and Technology (DUSD[S&T]) and from the staff of the Director, Operational Test & Evaluation (DOT&E) will review the proposals and prioritize them using criterion 1. The HPCAP principals will prioritize proposals using criteria 2 and 3, as reflected in their rank scoring. The Technical Evaluation Panel (TEP) will evaluate the proposals using criteria 4, 5, and 6. The following provides examples of how each criterion may be applied.

DoD Mission Priority and Criticality: This criterion reflects the priority assigned or assessed to a particular project evaluated against others within the context of a DoD-wide perspective. Emphasis will be placed on how well the project supports or relates to known DoD mission priorities. Proposal developers should discuss what impact their project's outcome will have on specific end products that will improve DoD effectiveness and/or efficiency for specific war fighting projects.

Service/Agency Mission Priority: This criterion may be represented, for example, by the Service/Agency priority for a few key weapon systems currently in the acquisition chain and for which this project provides support; the potential priority associated with new technology being supported for the long-term needs of the service/agency; or the priority of the project that requires extreme security measures.

Military Advantage Gained by Exploiting HPC: This criterion encompasses the potentially superior position the DoD may gain over adversaries through successful execution of the work supported by the proposed HPC resources. An example would be providing better, timelier information for a mission requirement such as a precision strike. The proposal could focus on specific advantages associated with systems under development or on the eventual advantage that would result from application of the science associated with the proposal.

Merit of Scientific Study Including Numerical Methods: This criterion focuses on the quality of the science, engineering, or analytical work that will be supported by the proposed HPC resources, as determined by the scientific or engineering community of interest. This could be focused on the engineering aspect, the advancement of information superiority, technology, or unique technical or engineering results that apply.

Potential for Significant Progress Gained by Exploiting HPC: This criterion considers evidence of past successes in performing the type of work to be supported by the proposed HPC resources. For example, a project proposal by an organization that has an existing infrastructure for supporting real-time HPC applications has a better chance for progress than one that has no previous real-time experience and/or existing infrastructure. A project that would be supported by experts in computer and information technology, that has successfully debugged and exploited new HPC architecture, would typically be better positioned to make progress in analyzing early access to a new HPC technology, than an organization without such a track record. A project justified on the basis of extreme security requirements should already have accredited secure facilities in place and experience with the IT requirements associated with operating in these environments. Quality of the personnel proposed on the project is also an important factor, as judged by experience, publications, presentations, and successful accomplishment of previous work.

Appropriateness of Hardware Solution for Meeting Requirements: This criterion considers such attributes as the processor, memory, graphics, interconnection network, and storage proposed and how these match the validated requirements of the projects to be supported in the proposal. It also considers the expected utilization of the proposed system in areas such as appropriateness of numerical methods on that architecture, use of simulation versus real military hardware, parallelization techniques, in addition to a well-balanced overall system. It could involve a determination of whether the storage, processor, and interconnecting network are consistent with the real-time data rate, or whether the proposed graphics system will support

real-time scene generation requirements. It could also include a discussion of the efficiency and effectiveness of proposed numerical methods or techniques for time critical support of man-in-the-loop and/or hardware-in-the-loop. A project evaluating new technology could be expected to propose solutions that may have some risks but would have significant value if the evaluations were successfully completed. It could include consideration of the extent to which the proposal may contribute to the suitability and effectiveness of future deployments of high performance computer technology. Another area that will be considered is the extent to which the workload justifying the HPC equipment truly requires high performance computing. Aggregation of many small projects, none of which alone requires high performance computing, is not an appropriate use of dedicated HPC resources. An analysis of alternative solutions would demonstrate that the selected solution has merit over other possible solutions.

Proposals will be reviewed by the various evaluation teams based on the evaluation factors provided above. No oral briefings are planned for the evaluation teams.

Criteria 1 will be evaluated by a combined DUSD(S&T) and DOT&E review panel, which has OSD-level S&T and T&E project oversight. This panel will consider all proposals, ranking them according to known DoD mission priorities.

Service/Agency mission priority and military advantage gained (criteria 2 and 3) are assessed by the HPCAP Service/Agency principals and submitted to the HPCMP in the form of ranked proposals from their respective Service/Agency.

The Technical Evaluation Panel (TEP) will determine technical merit using criteria 4, 5, and 6. The TEP consists of representatives from the Services and DoD Agencies, members of the Computational Technology Area Advisory Panel (CTAAP), and technical experts from outside of the DoD. HPCAP principals may participate in the TEP meetings as observers.

Should the TEP, during their technical review, require clarification of any portion of the project proposal or points of clarity to the proposal, a supplementary request will be made to the proposing project leader for a response to such questions. The original proposing project will then have eight working days to provide a response forwarded for coordination back to the DHPI Projects Manager. Responses from all projects queried will then be forwarded to the TEP for their clarification and consideration as they complete their review. The questions raised by the TEP, if any, will be forwarded to the proposing sites by 2 May 2006 and responses back will be due NLT 10 May 2006. Should there be no clarifications required of a proposing project, that project will also be notified accordingly.

Should the TEP, upon completion of its technical review, find the proposal technically unacceptable to solve the problem for which it was posed as the solution, the TEP will not amend the proposal as concerns the technical computing capability to make it a more viable solution. However, it is in the purview of the TEP to advise the Director/HPCMP on recommended changes in sub-components, e.g., number or type of processors, amounts of memory, total disk storage capacity, etc.

PROPOSAL SELECTION

Selection: Based on the results of the HPCAP rankings, the TEP review, and the combined DUSD (S&T) and DOT&E panel evaluation, the Director of the HPCMP will prepare recommendation(s) and forward them to the DUSD (S&T) for selection.

Disbursement of Resources: HPC resources and/or funding will be released to the organization proposing the selected project after receipt of a signed Terms of Reference (TOR) or Memorandum of Understanding (in the case of the HPCMPO directly procuring the resources) document in which the selected organization accepts the HPCMP oversight requirements and agrees to fulfill the stated obligations in their proposal to the HPCMP. These oversight requirements include an annual review of the project's progress at the DoD HPC Users Group Conference. For system acquisition, the HPCMP will in most cases utilize the buying power inherent in the TI-07 acquisition process to meet selected project acquisition needs. Unless out of scope of the TI-07 acquisition, the TI-07 acquisition will acquire the resources in coordination with the Project Lead and have the resources delivered to the project's site.

Schedule of Events—FY 2007 DC Selection Process:

Date	Action
25 January 2006	HPCMPO solicits FY 2007 Dedicated HPC Project Investment proposals
7 April 2006	Prioritized Dedicated HPC Project proposals due to HPCMPO from Service/Agency principals (Services and Agencies may have earlier internal deadlines)
8 April – 1 May 2006	Review for completeness by HPCMPO
18 April 2006	HPCMPO distributes all proposals to HPCAP principals
18 April 2006	HPCMPO distributes all proposals to Technical Evaluation Panel members
2 May 2006	HPCMPO distributes Technical Evaluation Panel questions (if any) for clarification to proposing sites
10 May 2006	Clarification responses from sites due to HPCMPO
Early June 2006	Technical Evaluation Panel reviews proposals
Mid June 2006	Combined DUSD (S&T) and DOT&E panel reviews proposals
21 July 2006	Director, HPCMP prepares recommendations for selection by DUSD (S&T)
October 2006	FY 2007 Dedicated HPC Project Investments awards announced

PROPOSAL CONTENT

Proposals are limited to ten pages (one-sided, 8-1/2" x 11" with one-inch margins). Supporting documents, not included in the ten pages, are limited to: the cover sheet, staff resumes, proposed equipment lists (vendor quotes preferred), and network diagrams. All documents, including copies of vendor quotes, need to be in the electronic copy of the proposal. Each proposal should address all points outlined below. **The proposals should be structured such that they contain the following sections in the order given.** Proposals that do not conform to this structure may be returned to the forwarding HPCAP principal without further consideration.

Cover Sheet: This part of the proposal package should provide a brief description of the following:

Identifier: Project title/name of requesting project and requesting proposed location for requested HPC resources. Include a U.S. mail address for the requesting project lead/manager, as well as an e-mail address and phone number.

Sponsoring Service/Agency and DoD Organization: List the Service/Agency and DoD organization sponsoring the Dedicated HPC Project.

Project leader/dedicated HPC project manager/financial manager: List the name of the project leader(s), the project's/organization's IT manager that will be providing IT support for the project (if any), and the financial manager. This **MUST** include address, telephone numbers and e-mail address for each leader(s) and manager so identified.

Technical emphasis: Describe the specific technical goals and objectives of the project to be supported by the HPC resources being requested.

Technical/engineering approach: Describe the technical/implementation approach.

Technical and computational challenges: Describe technical and computational challenges to be encountered in meeting the objectives.

Service/Agency impact: Describe Service/Agency impact of the work that will be performed through deployment and use of the HPC equipment.

Schedule: Provide key project milestones (from 24 to 36 months after system delivery).

Keywords: Summarize keywords used in the proposal.

Body of Proposal:

Introduction: This section addresses key proposal requirements in broad, general terms. Include a discussion of ongoing related work in the proposing organization and the wider scientific, technology, and testing and evaluation community.

Justification/DoD Relevance: This section will be used primarily to assess the potential for military advantage of this proposed project, the DoD mission priority, and its Service/Agency mission priority. Clearly state the military relevance of this proposal and what current and future DoD weapons systems or programs it will support, if any. Describe how this proposal supports the science and technology or test and evaluation program of DoD and/or your laboratory or test center, respectively. Explain how the support to be provided by this proposal, combined with the military relevance, translates into a military advantage to be gained by exploiting said HPC capability.

DoD Dedicated HPC Project Hardware Requirements: Please address the requirements for the project(s) to be supported by the proposal. If it is planned to use existing equipment to satisfy part of the requirement, complete one set of tables for the total requirement and another set showing what portion will be satisfied with existing equipment. Note: The requirements shown here must be commensurate with what was provided as input to the HPCMPO requirements database.

Project or Experiment	Typical Number of Processors	Maximum Number of Processors	Typical Number of Graphics Pipes	Maximum Number of Graphics Pipes	Typical Job Memory (GB)	Maximum Job Memory (GB)	Typical Job Secondary Storage (GB)	Maximum Job Secondary Storage (GB)

Project or Experiment	Typical Real-Time Data Rate	Maximum Real-Time Data Rate	Typical Real-Time Deadline	Minimum Real-Time Deadline	Typical Number of Iterations	Typical Duration of an Iteration	Equipment In the Loop (Y or N)	Man In the Loop (Y or N)

Required Resources and Justification: Justify computational resources required to satisfy the requirements in terms of total processor hours, real-time graphics requirements (if any), real-time processing requirements, dedicated system-level testing, and other relevant measures of quantifiable resource requirements. Include and justify memory, storage, graphics processing, networking, and software configurations. Discuss how each requested hardware and software element of the requested total computing resource plays into the complete computing paradigm being proposed; this includes any necessary interfaces and displays and other I/O systems. Provide a short discussion addressing the equipment configuration required to meet these requirements and alternative hardware configurations and include a rationale for the choices made. At a minimum, the preferred hardware solution must be compared with the alternative of using existing or planned shared HPC resources at MSRCs or ADCs so that a valid assessment can be made of the requirement for a Dedicated HPC Project. Include in this discussion operational factors (for example, program environment, operations support, and physical infrastructure) that would make it beneficial to project users, the proposing organization, the Service/Agency, and to the DoD to perform this work at the proposed resource location. Consideration and discussion of other valid alternatives are strongly encouraged. Describe the hardware capabilities being requested and how they will be used to assist in meeting overall project goals; this could include a discussion of any alternative solutions. Provide a rationale for connection to the DREN/SDREN if required, including the expected bandwidth requirements.

Technical Approach: This section will be used primarily to assess the scientific merit, potential for progress by the proposed project(s), and potential impact on mission areas supported. Ensure that computational science, computational engineering, real-time environment, and computer

science aspects are discussed. Clearly state the technical goals of the project(s) to be supported and lay out a program plan for achieving those goals. Discuss the expected advances in science and/or engineering that will result from this project's successful completion. Discuss project or mission area requirements to be satisfied and why the proposed HPC equipment is necessary to satisfy those requirements. If the proposed HPC equipment is to be embedded in a larger system or environment, show the overall system level architecture. Describe the proposed architecture and how it satisfies project requirements. Discuss specifically the operational/production level status of software to be used and numerical methods employed to satisfy requirements, particularly the software's efficiency on the proposed system.

Schedule: Provide a schedule (ending 24 months to 36 months after system delivery) with estimated milestones and anticipated accomplishments for HPC equipment acquisition and technical requirements to be supported by the proposed HPC equipment. Discuss technical and computational challenges expected to be encountered in the course of the project(s). The proposed milestones and impacts for at least the next two years are to be shown. Note that purchase orders issued via the TI-07 acquisition process are targeted for December of 2006 with actual delivery of equipment after that date.

Progress to Date: If this proposal is a continuation of a previously funded dedicated HPC project investment, discuss the progress to date. Discuss what remains to be executed and how this additional investment will facilitate further project impact.

Resumes: Include a *resume* for at least each of the key personnel. Key personnel are considered to be the Project Leader for the Dedicated HPC Project, the Dedicated HPC Project's IT Manager (if any), System Administrators, and the Information Systems Security Officer (ISSO).